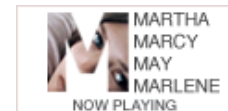


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After Abuse, Changes in the Brain

By [BENEDICT CAREY](#)

For years, [psychiatrists](#) have known that children who are abused or neglected run a high risk of developing mental problems later in life, from [anxiety](#) and [depression](#) to [substance abuse](#) and [suicide](#).

The connection is not surprising, but it raises a crucial scientific question: Does the abuse cause biological changes that may increase the risk for these problems?

Over the past decade or so, researchers at [McGill University](#) in Montreal, led by Michael Meaney, have shown that affectionate mothering alters the expression of genes in animals, allowing them to dampen their physiological response to stress. These biological buffers are then passed on to the next generation: rodents and nonhuman primates biologically primed to handle stress tend to be more nurturing to their own offspring, Dr. Meaney and other researchers have found.

Now, for the first time, they have direct evidence that the same system is at work in humans. In [a study of people who committed suicide published Sunday](#) in the journal Nature Neuroscience, researchers in Montreal report that people who were abused or neglected as children showed genetic alterations that likely made them more biologically sensitive to stress.

The findings help clarify the biology behind the wounds of a difficult childhood and hint at what constitutes resilience in those able to shake off such wounds.

The study "extends the animal work on the regulation of stress to humans in a dramatic way," Jaak Panksepp, an adjunct professor at [Washington State University](#) who was not involved in the research, wrote in an e-mail message.

He added that the study "suggests pathways that have promoted the psychic pain that makes life intolerable," and continued, "It's a wonderful example of how the study of animal models of emotional resilience can lead the way to understanding human vicissitudes."

In the study, scientists at McGill and the Singapore Institute for Clinical Sciences compared the brains of 12 people who had committed suicide and who had had difficult childhoods with 12 people who had committed suicide and who had not suffered abuse or neglect as children.

The scientists determined the nature of the subjects' upbringing by doing extensive interviews with next of kin, as well as investigating medical records. The brains are preserved at Douglas Hospital in Montreal as part of the Quebec Suicide Brain Bank, a program founded by McGill researchers to promote suicide studies that receives brain donations from around the province.

When people are under stress, the hormone [cortisol](#) circulates widely, putting the body on high alert. One way the brain reduces this physical anxiety is to make receptors on brain cells that help clear the cortisol,

inhibiting the distress and protecting neurons from extended exposure to the hormone, which can be damaging.

The researchers found that the genes that code for these receptors were about 40 percent less active in people who had been abused as children than in those who had not. The scientists found the same striking differences between the abused group and the brains of 12 control subjects, who had not been abused and who died from causes other than suicide. "It is good evidence that the same systems are at work in humans that we have seen in other animals," said Patrick McGowan, a postdoctoral fellow in Dr. Meaney's lab at McGill and the lead author of the study.

His co-authors, along with Dr. Meaney, were Aya Sasaki, Ana C. D'Alessio, Sergiy Dymov, Benoît Labonté and Moshe Szyf, all of McGill, and Dr. Gustavo Turecki, a McGill researcher who leads the Brain Bank.

Because of individual differences in the genetic machinery that regulates stress response, experts say, many people manage their distress despite awful childhoods. Others may find solace in other people, which helps them regulate the inevitable pain of living a full life.

"The bottom line is that this is a terrific line of work, but there is a very long way to go either to understand the effects of early experience or the causes of mental disorders," Dr. Steven Hyman, a professor of neurobiology at Harvard, wrote in an e-mail message.

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